

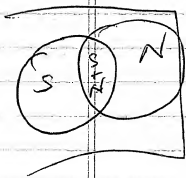
EXHIBIT D

or vegetable oil
 corn sunflower
 peanut palm
 canola
 lard, tallow
 fish oil
 Linc. butter
 liquified animal fat preparation
 for pet foods
 ammonium sulfide?

sulfur-donating reagent
 eg, ① salt, such as sulfides (Na, K, Ca, etc)
 ② cysteine, methionine
 cystine (2 S's linked together)
 cheaper by far

other S-containing A.A's
 ③ short peptide, such as glutathione
 ④ elemental sulfur (S₈, yellow powder)
 recombine w/ fat or fat residues
 ⑤ "sulfide liquor" from industrial (eg, paper, rubber)
 initial goal - combine liquor

add S to a fatty carrier that
 ① won't let powders settle out -
 powders typically don't mix soluble
 in fat
 easier to handle; sticks great



~~ammonium~~
 Ammonium sulfide - could work, but
 odor problems likely - incl. on final
 food, if any Am remains

N-donating reagents

- ① ~~copied~~ micro-org such as yeast - est. 10% - 13% ^{dry} by weight
fungal mycelia (strand)
- ② basic A A's
~~lys~~ arginine (& N's)
- ③ urea -
- ④ nucleotides -
more exp. than yeast, but possible
- ⑤ guanidino groups
- ⑥ heterocyclics -
but only if reactive, ready to donate
w/ lot of cooking costs

~~Pekin~~

~~Pek~~

distiller / brewers / bakers yeast
torula yeast - used to break down
"sulfide ^{liquor} waste" from paper-making

Two main ways

- ① low heat = $< 98^{\circ}\text{C}$
(anything under boiling)
- ② under pressure

reflux - tends to be lower losses

typical, ~~if~~ if pressure used

~~170~~ 170 to 200°C

10 psig to ~~100~~ psig (gen. by heat
15 min to 1 hr; with ramps
temperature)

typical, if reflux used

~~95~~ 95 to 98°C

ambient pressure, but closed vessel

1 to 6 hours

condensate ~~is~~ returned to ^{cooling} main vessel

4

Parr vessel = pressure cooker
pressure, programmable
if pres. oil

pressure, programmable

fat = triglyceride [veg. oils - triglycerides]
but diff F.A's
+ combination of fatty acids
+ glycerol (3 carbon), alcohol, triol

fat = combination of fatty acids

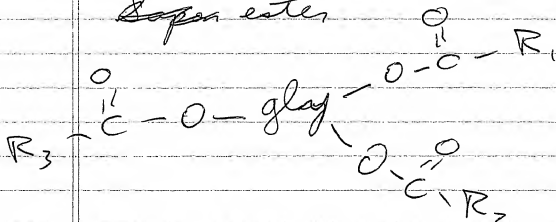
+ glycerol (3 carbon, alcohol), triol

[glycogen = mostly muscle, liver,] not
for quick breakdown in fat

in hat -

in fat -
covalent bonds betw. FAs + glycerol

Sapon ester



where $R1-R3$ are FA's

saponification - breaks the ester bonds
can be complete or partial
will regenerate COOH (COO^-) groups
on FAs

can be complete or partial

can be complete or partial
will regenerate COOH (COO^-) groups
on FA's

the N + S will react w/ C's where bonds were broken in HC chains - the heat breaks those bonds

goal - get smaller pieces/chunks from HC's + C' hydrates with N and/or S attached to small pieces

Joins -

liquified triglyceride prep - can be saponified before N/S addition

one good case of S added, w/o N source

S tends to give roasted flavor, "savory" dogs tend to prefer, cats less so, but they like fat-derived preps